

# APPLICATION OF ACOUSTIC TECHNIQUES IN THE EVALUATION OF HETEROGENEOUS BUILDING MATERIALS

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## ABSTRACT

In this paper, we present the results of an application of *in situ* non-destructive acoustic techniques to analyse the state of preservation of a colonnade of an ancient church in the Central Sardinia (Italy). In particular, low frequency ultrasonic tests and seismic longitudinal wave transmission tomography (SLWTT) techniques were applied on the columns of the church in order to provide information on their state of preservation and to detect possible defects, such as zones of weakness, damages and cracks in its inner parts that cannot be visually examined.

In order to improve the velocity input model for the SLWTT, a new experimental procedure based on the calculation of the cross-correlation function was proposed and usefully applied.

An estimate of the accuracy of the longitudinal wave velocity measurements by SLWTT methods was carried out by application of a standard error analysis based on the law of propagation of uncertainty.

Based on the results obtained with the ultrasonic and seismic investigations, we located microcores that confirmed information from the above non invasive investigations.

**Keywords:** Acoustic Techniques, Longitudinal wave, Ultrasound, Seismic Tomography

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